2 Sheets—Sheet 1.

A. J. ROBERTS.

HORSESHOE MACHINES.

No. 195,232. Patented Sept. 18, 1877.

Fig. 1

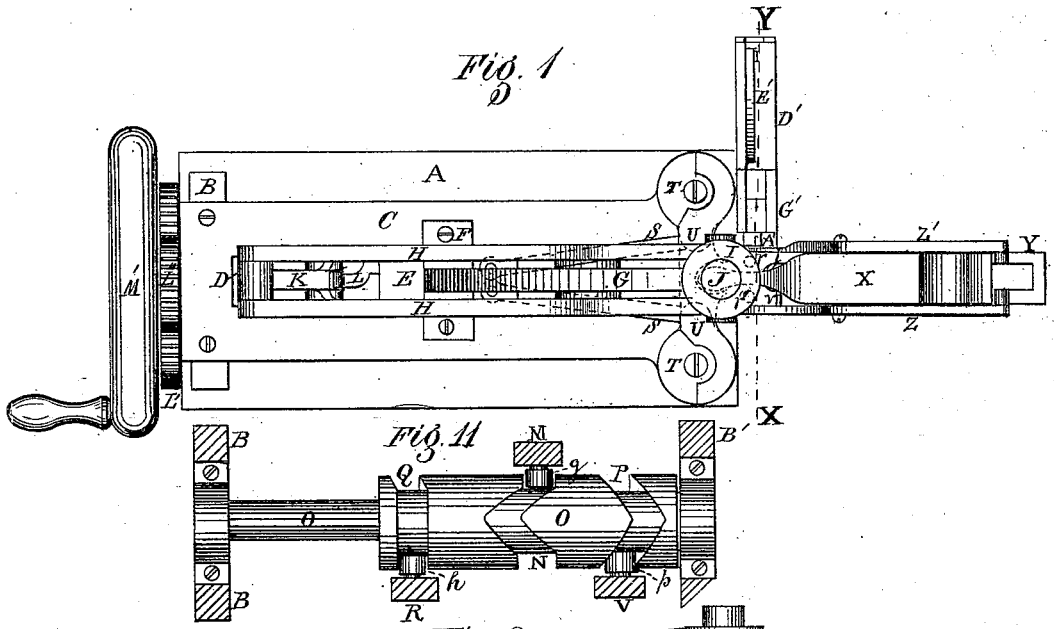
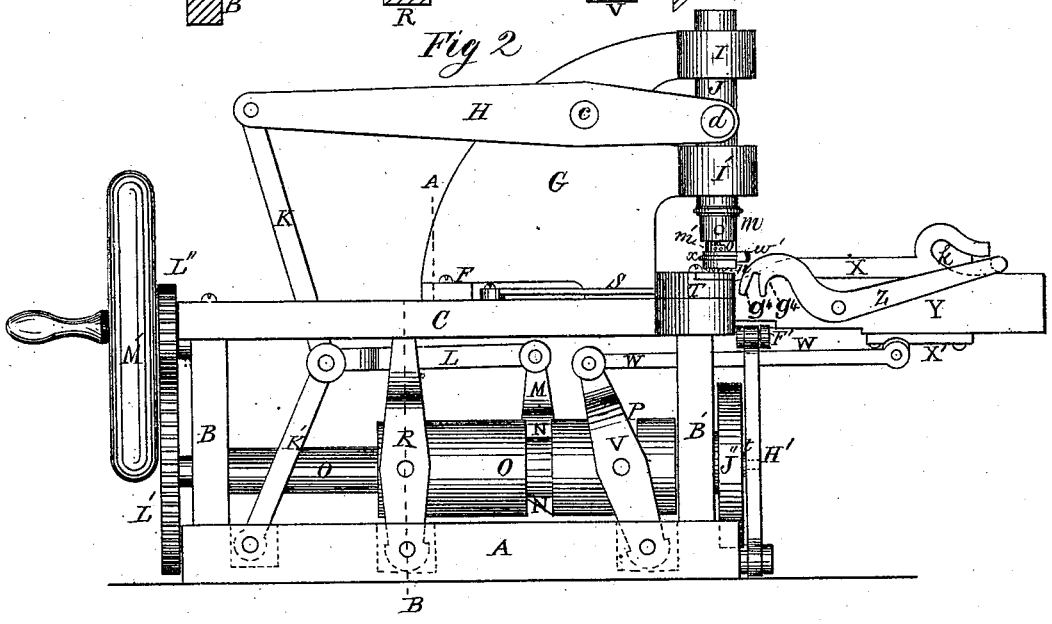


Fig. 11

Fig 2



Witnesses
Saml. M. Barton
Chas. Felton Pidgin.

Inventor
Andrew J. Roberts
by his attys
Edmund D. Wright.

2 Sheets—Sheet 2.

A. J. ROBERTS.

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Fig. 3

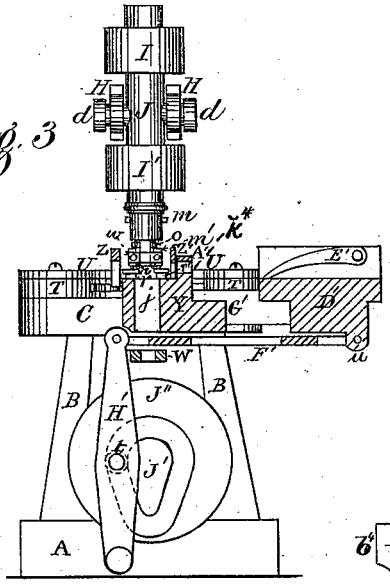


Fig. 5

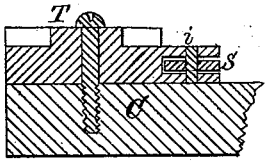


Fig. 6

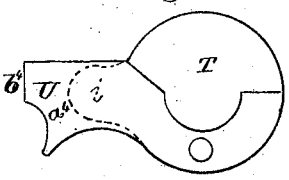


Fig. 4

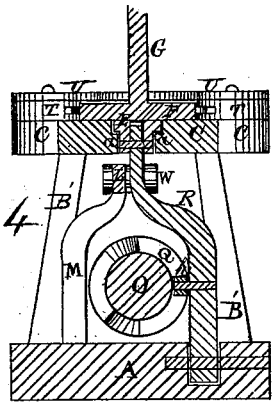


Fig. 10.

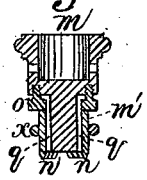


Fig. 7

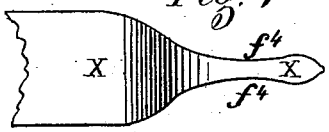


Fig. 9.

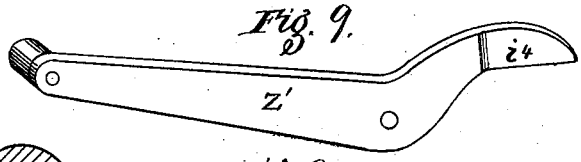
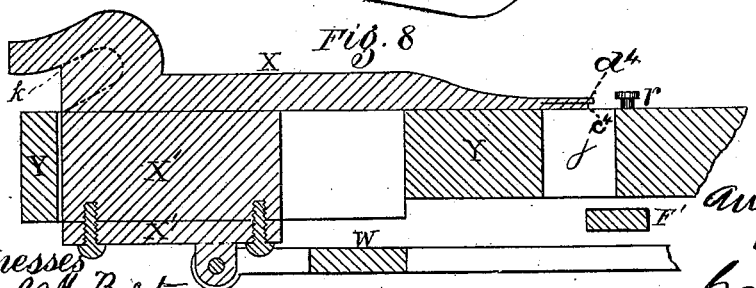


Fig. 8



Witnesses
Sam'l M. Barton
Chas. Fulton Pidgin.

Inventor
Austen J. Roberts,
by his attys.
Cawell & Wright.

UNITED STATES PATENT OFFICE.

ANDREW J. ROBERTS, OF BOSTON, ASSIGNOR TO HIMSELF AND MATHER E. HAWES, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN HORSESHOE-MACHINES.

Specification forming part of Letters Patent No. **195,232**, dated September 18, 1877; application filed December 26, 1876.

To all whom it may concern:

Be it known that I, A. J. ROBERTS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Horseshoes, of which the following is a specification:

The present invention relates to that class of horseshoe-machines in which the bar or blank from which the shoe is to be made is first bent about a former, of suitable shape, by forcing the bar and said former through a throat, and is then, and while on said former, pressed on its outer edge or side by side formers of suitable shape.

The invention consists in many novel arrangements of the parts making up such a machine, and in the combination of other parts therewith, whereby shoes can be made in a most expeditious, economical, and effective manner, and complete in one operation of the machine, all of which will most fully appear in the description hereinafter given, reference being had to the accompanying plates of drawings.

In Plate 1, Figure 1 is a plan view; Fig. 2, a side view, and Fig. 11 a detail view. In Plate 2, Fig. 3 is a transverse vertical section on line X Y, Fig. 1. Fig. 4 is a transverse vertical section on line A B, Fig. 2; Figs. 5, 6, 7, 8, 9, and 10, views in detail.

In the drawings, A represents a bed or platform, which supports a table, C, having open ends B B′ and a central longitudinal slot, D. This slot D of table C has ways *a* on each side, which support a horizontal plate, E, arranged to travel forward and back on said ways, moving under a cross-piece, F, which is secured to the top of the table C.

G is a curved standard, which is fixed and supported on cross piece F, and carries in its ear pieces or bearings I I′ a head-block, J, which is arranged to move up and down through said ear-pieces I I′, and at its lower end is adapted to receive a holder, *m*, for the punches, hereinafter referred to, which are to punch the crease and nail-holes of the horseshoes formed in the machines.

H H are two levers, which are arranged similarly, one on each side of the curved standard G, to swing in vertical planes, each on a fulcrum, *c*, of said standard G.

These levers H H, at one end, are hung on pivots *d* of the vertical rod J, and at the other end they are hung to a common vertical toggle-lever frame, K K′, which frame extends through the slot D of the table C, and has its lower arms K′ pivoted to the bed A, which is suitably slotted to allow said arms K′ to swing on said pivots as desired.

L is a horizontal rod, hung at one end to the elbow or knee joint of the toggle-lever frame K K′, and at the other end to the upper end of the lever M, which, in turn, is hung on a fulcrum of the bed A, and is arranged to be acted upon through its friction-roller *g* by the cam-slot N of a shaft, O, horizontally and longitudinally arranged on the bed A to turn in suitable bearings thereof, and by gear-wheels L′ L″ to be driven in any suitable manner.

This cam-slot N is shaped to swing the lever M on its fulcrum forward and backward, once for each revolution of the shaft O, and during one-quarter of such revolution, and at all other times, to hold the said lever stationary.

This forward and backward swing of the lever M operates through the connecting-rod L on the toggle-lever frame K K′, and through it and the levers H H on the head-block J, and gives to said head-block an up-and-down movement through its bearings I I′.

R is a vertical lever, which at one end is hung on a fulcrum of the bed A, and at the other end is pivoted to the horizontal sliding plate E, hereinbefore referred to, of the table C, and between its two ends it is arranged to be acted upon through its friction-roller *h* by the cam-groove Q of the driving-shaft O.

This cam Q is shaped to swing the lever R on its fulcrum in each revolution of the shaft O, once forward and once backward, and for said movements to be made each in an eighth part of the revolution of the shaft, and also to hold the said lever twice stationary between

and after said movements, once for one-quarter and once for one-half of the revolution of the shaft.

This forward and backward swing of the lever R slides the horizontal plate E forward and backward on its guideways *a* of the table C, and through it operates the side formers U of the machine, which are to be now described, and their connection with it.

S S are two horizontal rods, both pivoted at one end to the sliding plate E, one on each side of the curved standard G, and at the other end each to a similar horizontal curved lever T, each of which levers T turns on a fulcrum of the table C and carries a former, U, which formers, at their peripheries or edges a^4, are shaped to entirely encircle the outer edge or side of the horseshoe, such as the machine is to make, and to come together at the straight part b^4 of their edges a^4—that is, at the toe of the shoe.

The formers U are to be attached to their carrying-levers T by a screw or otherwise, so as to be readily attached and detached, if desired, to replace them with the same or other sizes and shapes, and they are disposed on their carrying-levers T, and said carrying-levers are disposed relatively to each other and to the axial line of the vertically-traveling head-block J, which carries the nail-hole and crease punches, as has been before stated, for the curved edges of the formers U, and nail-hole and crease punches to act in proper relation to each other, and to the proper formation of a horseshoe, as will hereinafter more fully appear.

The formers U are operated, as before stated, by the cam Q of driving-shaft O, and this operation consists in swinging them toward and away from the axial line of the vertical punch-carrier or head-block J, and in holding them for one-half of a revolution of the shaft O in their forward position, and for one-quarter of a revolution of said shaft in their backward position.

V is a vertical lever, which, at one end, is hung on a fulcrum of the bed A, and at the other end is hung on one end of a horizontal arm, W, which, at its other end, is hung to the under side of a block, X′, arranged for a forward and backward movement on a horizontal frame, Y, which is suitably supported by the table C in front of the vertical punch-carrier or head-block, J, and for said travel of the block X′ to be in the direction of the length of the table and toward and away from the axial line of said punch-carrier or head-block J. This lever V, between its ends, hung as above described, is acted upon through its friction-roller *p*, by the cam-groove P of the driving-shaft O, and this cam-groove P is shaped to swing the lever V on its fulcrum forward and backward once for each revolution of the shaft O, and during three-quarters of such revolution, and to hold the said lever stationary for the remaining quarter, and thus, through the connecting-rod W, to slide the block X′ toward and away from the axial line of the vertical punch-carrier or head-block J, and to hold it in its forward position during one-quarter of the revolution of the driving-shaft O.

X is the former for the inner periphery or contour of a horseshoe. This former X is carried by the slide-block X′, and it is located thereon, so that in the above-described movement of the slide-block X′ toward the vertical punch-carrier or head-block J, and in the above-described rest of said block in its forward position, it will travel over and lie upon the upper surface of the table C, and have its contour or edge c^4, which gives the inner contour or shape to the horseshoe, in proper position relative to the shaping-edges of the side formers and the punches of the vertically-arranged carrier or head-block J. This former X has a flange, d^4, which projects from the upper contour or shaping-edge c^4 into a position to rest upon the upper surface of the horseshoe being made in the operation of this machine, and which, on its under face, is shaped to press and form, as may be desired, the upper surface of the horseshoe. This projecting flange d^4 of the former X is plainly shown in Fig. 8; also its contour in Fig. 7, and the inward-curving sides or edges f^4 from the former proper back toward its carrying-block X′.

r r′ are two vertical rollers located on the table C, in a position for the former X to pass between them. These rollers *r r′* are flanged at their upper ends, and together they make a throat through which the former X passes in its forward and backward travel; and in the operation of this machine, as will hereinafter more fully appear, they act to bend the bar from which the horseshoe is to be made about the former X as such former passes inward and toward the side formers U U and the vertical axial line of the head-block J, which carries the nail-hole and crease punches.

Z Z′ are two levers, each hung to swing in a vertical plane on a fulcrum of the frame Y, and one on each side thereof. These two levers are operated upon, at one end, through friction-rolls there located, by similar curved cam slots or grooves *k* of the slide-block X′, which carries the former X, and, at their other ends, the one lever, Z, is formed with jaws g^4 of suitable shape in cross-section to receive and grasp the bar from which a horseshoe is to be made; and the other lever, Z′, is formed with a cutting-edge, i^4, (see Fig. 9,) suitable to cut the bar which is fed into the machine into lengths for making horseshoes.

The shape of the cam-slots *k k* is such as to swing the levers Z Z′ in a vertical plane simultaneously, lowering their jaws g^4 and cutting-edge i^4, in the outward travel of the former X, from the side formers U U, and raising them, in the inward travel of said former X, toward said side formers U U.

A′ is a block located outside of the cutting-lever Z′, and there supported on a stationary frame-work, G′, in position for it and the cutting-edge i^4 of the cutting-lever Z′ to act in conjunction, like shears, in cutting the iron bar from which horseshoes are to be made into lengths.

k^4 is an opening in block A′. (See Fig. 3.) Through this opening k^4 the iron bar from which horseshoes are to be made is fed, and the opening is disposed, together with the feed mechanism of the iron bar, so as to lay the bar, by the operation of its feed, across the line of travel of the former X, and in a plane above it, and at the same time place the bar in the holding-jaws g^4 of the lever Z, which lever Z, at that time, is in position to receive it.

The feeding mechanism of the iron bar or blank is as follows:

D′ is a slide-block, arranged to be moved horizontally in a suitable guideway of the frame-work G′, forward to and backward from the opening k^4, through said cutting-off block A′.

E′ is a spring-pawl hung on the upright wall of the slide-block D′, with its engaging end toward the block A′.

F′ is a horizontal connecting-rod hung at one end to the under side of the feed slide-block D′, and at the other end to the upper end of a vertical lever, H′, which is hung at its lower end upon a fulcrum of the bed A, and between its two ends is operated upon through its friction-roller *t*, by the cam-groove J′, formed in the face of a disk, J″, of the driving-shaft O.

This cam-groove J′ is shaped for the lever H′ to be swung forward and backward once for each revolution of the driving-shaft O, and during one half of the revolution, and to be held stationary during the other half of the same revolution, and thus, through the connecting-rod F′, the feed slide-block D′ for the iron bar is moved toward and away from the cutting-off block A′, and, from the disposition of said cam on the shaft O, held at rest in its position away from the block A′ for one-half of each revolution of the shaft.

The holder *m* for the nail-hole and crease punches is placed by its socket end (see Fig. 10) over the lower end of the vertically-moving head-block J, and is there secured by a set-screw or bolt, or in any other proper manner.

m′ is a die, having beveled projections and prongs *n*. The projections are of suitable shape to make or punch the crease in the horseshoe, and the prongs are of suitable shape and length, relatively to said projections, to punch holes through the thickness of the horseshoe to receive the nails by which the shoe is to be fastened to a horse's hoof, and all the projections and prongs are in the same line about the die, which is a line of curve corresponding substantially to the curved outline of a horseshoe, and for the crease and nail-holes to be made in the shoe near the outer edge.

This die *m′* is fastened about the holder *m* by an encircling band or yoke, *x*, secured by a cross-bar, *w*, and screw-nuts *w′*, and the lower or under face of the holder, within the beveled crease and nail-hole punching projections and prongs, is situated in relation to said punches to press on the upper side of the former X, when such former is in its position within the side formers U U, and thus to bear and to hold its projecting flange d^4 firmly down upon the upper face of the shoe which is inside of said punching projections.

v is a pin fastened to the inner face of the bar-holding lever Z, (see Fig. 1,) and in a position to knock the horseshoe, formed on the former X, off of it in the backward movement of said lever, as will hereinafter appear.

With the several cams N P Q J′ properly disposed in relation to each other and to the revolution of the driving-shaft O, and with the feed-block D′ for the rolled bar just about moving forward, the use and operation of the several parts of the machine above described are as follows: First place the rolled bar from which the shoes are to be made on the feed-block D′, under its pawl E′ and against its raised back, and set the end of the bar in the opening of the cutting-block A′, and even with its inner or cutting face. Now, turn the driving-shaft in the proper direction, and in the revolution of such shaft first the rolled bar, placed as described, is fed by the pawl E′ of its feed-block under the cutting-edge i^4 of the cutting-lever Z′, across and above the plane of travel of the former X into the holding jaws g^4 of the lever Z; second, the rolled bar so fed is then cut off by the cutting-lever Z′, and also, by such lever and the jaw-lever Z, pressed down into the plane of travel of the former X and to a rest on the upper face of the frame Y, just in front and across the throat of the rollers *r r′* and the opening *j* in the frame Y; third, the said cut-off piece of the rolled bar is then carried forward by the former X through the throat of the rollers *r r′*, and by these rollers it is bent about the contour and under the flange of the said former, and carried by said former X into position under the head-block J, which carries the punching and pressing die *m*, and within the side formers U U for the then action of such punching and pressing die and said side formers.

After this action of the punching and pressing die and side formers, they are withdrawn, leaving the shoe on the former X, which then carries it out of said side formers U, and from which former X it is knocked off by the knocker-pin of the jaw-lever Z, and discharged through the opening *j* before referred to, and which is suitably located therefor.

While a piece of the rolled bar, cut off, as stated, is being operated upon, as above described, the feed-block for the rolled bar is

carried back to its first position, and as its pawl E′ does not then act on the bar, the bar is left in the forward position to which it had been previously fed and cut off—that is, with its forward end flush, or practically so, with the inner face of the cutting-block A′, and said feed-block remains in its said backward position until its operating-cam again moves it forward, when it again carries forward and places the rolled bar, as has been described, for being again cut off, and the piece then so cut off bent, and otherwise operated upon by the former X, rollers *r r′*, punch and pressing die *m*, side formers U U, and knocker-off *v*, as has been described, and so on as long as the driving-shaft is turned and the feeding-block properly supplied with the rolled bar or iron.

The forward feed and placing of the rolled bar into position to be cut and pressed down, as above stated, occur in proper time for the after movements of the levers Z Z′, which cut and press the bar down, and also occurs in such relation to the then outward travel of the former X from the side formers U U and punching and pressing die *m*, by which travel of said former X said levers are operated, that the former X will have been carried from under the rolled bar, and will have had the shoe which was previously formed about it knocked from it by the knocker-pin *v* of the jaw-lever Z.

The punching and pressing die *m* and side formers U U are moved toward each other after the former X has come into position within their plane of operation, and they move away from each other just prior to the outward travel of the former X, and in time to free the shoe to be carried out by said former X.

From the description which has been given of my improved machine, it is plain that a bar is always ready to be taken by the former X, and without any interruption in the operation of the machine. Again, that the shoe is pressed or swaged at once on all sides, on top, and bottom between the under face of the flange d^4 of the former X and the upper face of the table C, and on its outer and inner edges between the side formers U and the contour of the former X; and, again, that the crease and nail-holes are made in the shoe, and that, in fact, in a single machine, and by one complete operation thereof, a complete and perfect shoe, pressed, creased, and punched, is produced.

o are screws in the lower end of the die-holder *m*, the heads of which make the bearing for the upper end of the die *m′*, and thus, by a proper setting of them into or out of the said holder, enable the position of the die *m′*—that is, of its creasing and punching edge—to be changed as may be desired; or, in other words, raised or lowered relatively to its work on the shoe.

q are channels or grooves on outer side of die-head *m*, and between it and the inner upright face of the die-plate. These grooves allow water to be introduced and passed between the die *m′* and its head *m*, so as to cool off the die from time to time, or continuously, in the operation of the machine.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a horseshoe-machine, the combination of the transverse feeder D′, the longitudinal former X, rollers *r r′*, the oscillating transverse formers U, and pressing-die *m*, all combined and operating substantially as described.

2. Levers Z Z′, pivoted to the guide-frame Y of former X, and formed in their forward ends, respectively, with jaws and with a cutter, in combination with the cam *k* of the traveling former X, substantially as and for the purposes herein set forth.

3. In a horseshoe-machine, a transverse feeder having a pivoted pawl or other suitable bar-holder, and arranged to travel on a frame, G′, having a cut-off block, A′, in combination with a former, X, frame Y, and levers Z Z′, all arranged and operating substantially as specified, and for the purpose described.

4. In a horseshoe-machine, a rotating shaft, O, provided with cams J, P, Q, and N, in combination with the several mechanical devices described connecting said cams with the feeder D′, formers X U, and pressing-die *m*, all arranged and operating substantially as and for the purpose described.

5. In a horseshoe-machine, the pressing-die *m*, having a socket to receive the head-block J, and recessed and curved on its front and sides to receive a die, and formed on its sides with vertical grooves or channels *q* for the introduction of water to the bottom of the die, substantially as described, and for the purposes specified.

6. The die *m′*, curved in the contour of a horseshoe, and formed on its bottom with flanges and prongs, to form the grooves and nail-holes of the shoe, and having a curved yoke, *x*, with screw ends, which extend through a cross-bar, *w*, and are secured to it by screw-nuts *w′*, all substantially as herein set forth.

7. The die-holder *m*, provided with a suitable die, arranged and operating as described, in combination with the formers U X, rollers *r r′*, levers Z Z′, and feeder D′, all arranged and operating substantially as specified, and for the purposes herein set forth.

8. The adjusting-screws *o* of die-holder *m*, for the purpose specified, in combination with the punching and creasing die *m′*, secured about the holder *m*, substantially as described.

9. The projecting flange d^4 of the former X, in combination with the pressing-face of the die-holder *m*, substantially as described, for the purpose specified.

10. The guide k^4 for the horseshoe-bar in its feed to the machine, which guide is arranged to guide the bar across and in a horizontal plane so different from the horizontal plane in which the longitudinal former X travels that the feed of said bar can occur while the said former is moving, and without interference therewith, in combination with mechanism, substantially such as herein described, which is arranged to receive the said bar, when fed as aforesaid, and to carry it into the horizontal plane of movement of the longitudinal former X, all substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW J. ROBERTS.

Witnesses:
SAML. M. BARTON,
CARROLL D. WRIGHT.